2023.

5th CROATIAN NEURORADIOLOGICAL MEETING

ZAGREB

December 02-03, 2023

2023.

5th CROATIAN NEURORADIOLOGICAL MEETING

SCIENTIFIC ORGANIZER:

CROATIAN MEDICAL ASSOCIATION

CROATIAN NEURORADIOLOGICAL SOCIETY – DIAGNOSTIC AND INTERVENTIONAL

ORGANIZING COMMITTEE: DAVID OZRETIĆ, KREŠIMIR DOLIĆ, MARTINA ŠPERO, ANA TRIPALO BATOŠ, ANA MULDINI DRAGOJA, VLADIMIR KALOUSEK, IVAN JOVANOVIĆ, BOŽO ĆURĆIJA

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General information:

Hotel International, Zagreb
Miramarska Cesta 24, 10000, Zagreb

Congress information:

Congress certificate:
The event will be scored by the Croatian Medical Chamber.

Accreditation:
All delegates and guests will receive accreditation with their names on the registration table. The accreditation is an official document and should be carried at all times.

Scientific organizer

Croatian Medical Association
Croatian Neuroradiological Society – Diagnostic and Interventional

Tehnical organizer:

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REGISTRATION

CATEGORY	PRICE
MEMBER OF CNS*	150,00 €
REGULAR FEE	200,00 €
RESIDENTS FEE	100,00 €

*** Croatian neuroradiological society**

Registration fee includes:

- access to all scheduled lectures
- congress material
- 2 coffee breaks and lunch as per program
- congress dinner

Registration fee does not include:

- personal expenses
- accommodation
- meals other than what's stated in "registration includes"

FACULTY

- Tarek Yousry
- Andrea Rossi
- Cem Calli
- Pia Maly Sundgren
- Turgut Tali
- Katarina Šurlan Popović
- Naci Kocer
- Robert Semnic
- Krešimir Dolić
- Jasmina Plašćak
- Martina Špero
- Miloš Lučić
- Milan Radoš
- Jasmina Boban
- Karlo Stemberger
- Filip Samardžić
- Nikola Anđelić
- Đurad Perović
- Milica Mastilović
- Marin Štefančić
- Anja Đurđević
- Ivan Jovanović
- Nikola Boban
- Tomislav Herega
- Sara Sablić
- Danilo Gardijan
- Petar Fekete
- Ana Muldini Dragoja
- Dina Miletić Rigo
- Ivan Kraljević
- Zdravka Krivdić Dupan
- Mirjana Flegarić
- Andrijana Jović
- Mia Smoljan Basuga
- Ana Vukić Radić
- Matea Prenc
- Ana Radić Vukić
- Milica Latinović
- Božo Ćurčija
- Ivana Pogledić

WELCOMING WORDS

Dear colleagues, dear friends,

after we finally established Croatial Neuroradiological Society, our 5th Croatian Neuroradiological meeting will follow. New dates are December 2-3, 2023, at Hotel International Zagreb, just at the start of world famous Advent!

The meeting will consist of invited lectures on various diagnostic and interventional topics, held by distinguished international speakers, but main focus is on Your presentations – everybody is invited to submit a title or an abstract of short presentation, best ones will be rewarded.

I am sure that we will again achieve highest professional and scientific level as with our previous meetings, and will once more have good time exchanging experiences and discussing problems.

You are all invited to join us this winter in Zagreb at the most important neuroradiological event in Croatia!

Sincerely yours,
David Ozretić, MD, PhD
President of Croatian Neuroradiological Society – Diagnostic and Interventional

SATURDAY, 02.12.2023.

08:45 – 09:00	Opening ceremony
09:00 - 09:30	Tarek Yousry - Role of Gad in the management of MS
09:30 - 10:00	Andrea Rossi - Imaging of pediatric epilepsy
10:00 - 10:30	Cem Calli - Glioma or not?
10:30 - 11:00	Naci Kocer - AVM treatment indications and approach
11:00 – 11:30	**Coffee break**
11:30 – 12:00	Ivan Jovanović - Extended time window for stroke treatment - role of imaging
12:00 – 12:30	David Ozretić - Vascular malformations of head & neck
12:30 – 13:00	Milan Radoš - No Arachnoid Granulations - No Problems
13:00 – 13:30	Miloš Lučić - AI & neuroradiology: witnessing the history of the future
13:30 – 14:30	**Lunch**
14:30 – 14:50	Robert Semnic – Dijagnostičke greške u neuroradiologiji
14:50 – 15:10	Krešimir Dolić – Imaging of skull base tumors
15:10 – 15:30	Jasmina Plašćak – MR dijagnostika Menierove bolesti
15:30 - 15:50	Martina Špero – How tough is the tough body?
15:50 – 16:20	**Coffee break**

SATURDAY, 02.12.2023.

16:20 – 16:35	Jasmina Boban – Is the increase in limbic volume a pattern of neuroplasticity in chemobrain?
16:35 – 16:45	Karlo Stemberger - Resting state functional MRI in term and preterm neonates: exploring early brain connectivity
16:45 - 16:55	Filip Samardžić - Postprocessing in fMRI studies for clinical use
16:55 – 17:05	Nikola Anđelić - Olfactory Dysfunction and Volumetry of Olfactory Bulbs After COVID-19
17:05 - 17:15	Đurad Perović - Navođenje neurokirurških zahvata kod tumora mozga - značaj DTI u kliničkoj praksi
17:15 – 17:25	Milica Mastilović - Imaging evaluation of radiation necrosis of the brain: pearls and pitfalls
17:25 – 17:35	Marin Štefančić - Neuroimaging in headaches related to intracranial pressure changes: IIH vs SIH
17:35 – 17:45	Anja Đurđević - Metotrexate induced leukoencephalopathy in patient with primary CNS lymphoma - case report

SUNDAY, 03.12.2023.

09:00 – 09:15	Nikola Boban - Mehaničke trombektomije u posteriornoj cirkulaciji - iskustvo Univerzitetskog kliničkog centra Vojvodine
09:15 - 09:25	Tomislav Herega - Povezanost vrijednosti leptomeningealne kolateralne cirkulacije na CT angiografiji s dugoročnim funkcionalnim ishodom nakon endovaskularnog liječenja okluzije arterija prednje cirkulacije
09:25 - 09:35	Sara Sablić - The presence of communicating arteries in the circle of willis is associated with higher rate of functional recovery after anterior circulation ischemic stroke
09:35 – 09:45	Danilo Gardijan - Relation between major adverse cardiovascular events and intracranial artery calcifications in patients on hemodialysis
09:45 - 09:55	Petar Fekete - Duralne arteriovenske fistule u intervencijskoj radiologiji - pogled kroz oči specijalizanta
09:55 - 10:05	Ana Muldini Dragoja - Tuberculous spondylitis – old disease in new clothes?
10:05 - 10:15	Dina Miletić Rigo - VBQ and T1 lumbar spine score correlation with DEXA as prediction factors for osteoporosis in operated patients
10:15 - 10:25	Ivan Kraljević - Hirayama Disease In An Adolescent Male: A Case Report
10:25 - 10:55	**Coffee break**

SUNDAY, 03.12.2023.

10:55 – 11:10	Zdravka Krivdić Dupan - CT dijagnostika karcinoma usne šupljine i orofarinksa – značaj radiološke interpretacije u planiranju liječenja
11:10 - 11:25	Mirjana Flegarić - Imaging of acute head and neck infections and inflammations
11:25 - 11:40	Andrijana Jović - Dijagnostika patoloških stanja brahijalnog pleksusa magnetskom rezonancijom
11:40 - 11:55	Mia Smoljan Basuga - Dental radiology at a glance
11:55 - 12:05	Ana Vukić Radić - Važnost magnetske rezonancije u dijagnostici sindroma kavernoznog sinusa: prikaz slučaja
12:05 - 12:15	Matea Prenc - CT and MR Imaging Findings of Lingual Nerve Perineural Spread
12:15 - 12:25	Petra Lovrak - Primarni intraorbitalni limfom
12:25 - 12:35	Milica Latinović - „Fragilni X" kroz prizmu adultnog neuroradiologa s prikazom slučaja
12:40 - 12:50	Božo Ćurčija - Beeng Neel sindromom.Važnost slikovnog prikaza u multidisciplinarnom pristupu rane
12:35 - 12:45	dijagnoze, terapijskom praćenju i prikaz slučaja
12:45 - 12:55	Domagoj Lasić - Primjena metode uvjetne sferne dekonvolucije u analizi talamokortikalnih projekcija nedonoščeta
13:00 - 14:00	Lunch
14:00 - 14:20	Ivana Pogledić - Pediatric neuroradiology: case review
14:20 – 14:30	Closing ceremony and best presentation award

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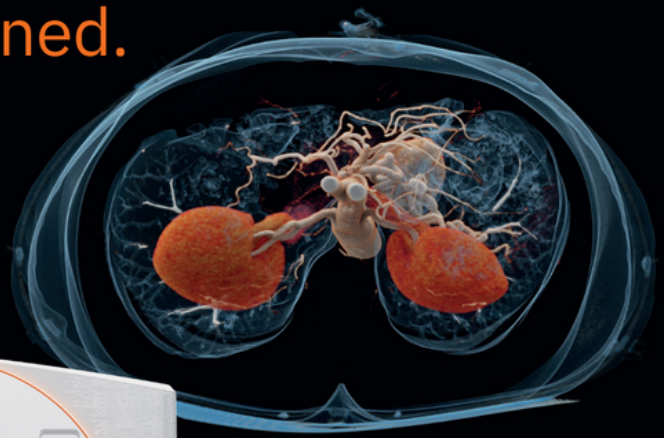

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ABSTRACT

Authors: Domagoj Lasić 1, Finn Lennartsson 2, Jelena Božek 3, Ruža Grizelj 4, Tomislav Ćaleta 4, Iva Vukušić 4, Ana Katušić 5, Ivica Kostović 5, Marko Radoš 1, Karlo Stemberger 1, Milan Radoš 5

1 Department of Diagnostic and Interventional Neuroradiology, University Hospital Centre Zagreb, Zagreb, Croatia
2 Department of Radiology, Lund University, Lund, Sweden
3 Faculty of Electrical Engineering and Computing, University of Zagreb, Zagreb, Croatia
4 Department of Pediatrics, University Hospital Centre Zagreb, Zagreb, Croatia
5 Croatian Institute for Brain Research, School of Medicine, University of Zagreb, Zagreb, Croatia

Application of the Method of Constrained Spherical Deconvolution in the Analysis of Thalamocortical Projections in Preterm Infants

Introduction:
The analysis of thalamocortical projections recorded on Magnetic Resonance Imaging (MRI) using the standard method of diffusion tensors is unsatisfactory because it cannot reconstruct axonal pathways in areas of their crossing. The development of High Angular Resolution Diffusion Imaging (HARDI) protocols and subsequent analysis by the method of constrained spherical deconvolution (CSD) have significantly improved the reconstruction of axonal pathways in crossing zones and enabled the quantification of their microstructural characteristics.
Objective:
The aim of our study is to test the capabilities of reconstructing thalamocortical projections in the brains of preterm infants using CSD on MRI performed according to the HARDI protocol at a corrected gestational age.
Methods:
In our research to date, 70 preterm infants have been included who were scanned at a term equivalent age on a 3T MRI device (Siemens, Magnetom PrismaFIT) using multi-band diffusion sequences specially adapted for children in the neonatal period, utilizing 106 scanning planes with b-values of 0, 400, 1000, and 2600 s/mm2. High-resolution T2 sequences were also recorded for all subjects, which were used for segmentation of the cortex and subcortical structures. Diffusion recordings were corrected for movement artifacts, susceptibility, and eddy currents, and probabilistic tractography analysis using CSD that was used for the reconstruction of thalamocortical projections.
Results:
The application of HARDI protocols adapted for the neonatal brain and subsequent analysis using CSD allow for the reconstruction of thalamocortical projections and the quantification of their microstructural characteristics in preterm infants at a term equivalent age.
Conclusion:
The CSD method can assist in the timely detection of perinatal brain lesions in preterm infants, which is a prerequisite for early therapeutic intervention that significantly improves the overall neurodevelopmental outcome and quality of life.

ABSTRACT

Authors: Robert Semnic
Akademska bolnica Uppsala, Švedska; KB Dubrava, Zagreb

Dijagnostičke greške neuroradiologiji
UVOD: Greška predstavlja odstupanje od očekivane norme, bez obzira na to da li uzrokuje štetu. Dijagnostičke greške se javljaju u svakodnevnom rutinskom radu u 3-5% slučajeva, retrospektivno u radiološkim studijama do 30%, češće u urgentnoj službi, kod specijalizanta, češće kod CT dijagnostike nego MR dijagnostike. Podjela grešaka u radiologiji: 1) greške u opažanju - perceptivne (60-80%), 2) kognitivne greške - greške interpretacije (20-40%) 3) lezije su previđene i nisu opisane (lažno negativni nalazi) 4) normalna varijanta ili artefakt su proglašene za leziju (lažno pozitivni nalazi). Uzroci koji dovode do grešaka: a) vizuelni ili mentalni zamor radiologa, česti prekide tokom evaluacije snimaka, izostanka komparacije s ranijim pregledima, nekompletni ili neadekvatni pregledi i problemi u komunikaciji sa kliničarem. Radiolog je izložen različitim kognitivnim pristrasnostima od kojih su najčešće fiksacija na ranu diagnozu pri čemu se odbacuju dalji dokazi koji mogu da joj protivureče ili je prisutno pretjerano oslanjanje na radiološki nalaz prethodnih pregleda. U današnjoj bolničkoj praksi je prisutan konstantni pritisak na radiološke odjele da povećaju brzinu i učinak bez adekvatne pripreme resursa a veći broj grešaka se javlja ako se interpretira više od 20 studija na dan. Radiolog može napisati radiološki izvještaj slabo, nekoherentno, nejasno ili kontradiktorno. Načini procjene greške: 1) personalni način se oslanja na legalizam dok 2) sistemski pristup razmatra što treba poduzeti da se greška ne ponovi. Da bi se radiolog proglasio krivim za nesavjesno liječenje treba da postoje sljedeći preduvjeti: da postoji relacija "lekar - pacijent", da je radiolog prekršio norme zdravstvene zaštite i da je akt nemara djelovao štetno i prouzrokovao posljedice po zdravlje pacijenta. Faktori koji reduciraju greške: sastanci na kojima se diskutuje o greškama, standardizacija CT/MR protokola, protokoli komunikacije, multidisciplinarni sastanci, strukturirani radiološki izvještaj, dvostruko pregledanje nalaza i kontinurana medicinska edukacija.

CILJ: Revijalni rad

METODE: Revijalni rad

REZULTATI: Revijalni rad

ZAKLJUČAK: Revijalni rad

ABSTRACT

Authors: Zdravka Krivdić Dupan1,2; Silva Guljaš1,2; Marin Štefančić 3; Ivan Mumlek4, Vedran Zubcic2,4

1 – UHC Osijek, Clinical Department of Diagnostic and Interventional Radiology, Osijek, Croatia

2 – Faculty of Medicine Osijek, J.J. Strossmayer University, Osijek, Croatia

3 – National Memorial Hospital „dr Juraj Njavro" Vukovar, Department of Radiology, Vukovar, Croatia

4 – UHC Osijek, Department of Maxillofacial Surgery, Osijek, Croatia

CT diagnosis of the oral cavity and oropharynx cancer- the importance of radiological interpretation in treatment planning

Introduction:

Squamous cell carcinomas of the oral cavity and oropharynx have a dichotomous nature with one subgroup of the disease associated with tobacco and alcohol use, and another group with human papillomavirus infection.

Imaging studies play an important role in establishing a diagnosis, determining the extension of the tumor process, formulating appropriate treatment strategies and monitoring patients suffering from and treated for cancer of the oral cavity and oropharynx. A good knowledge of anatomy is important for the interpretation of radiological findings and the analysis of pathological changes, as well as the analysis of drainage groups of lymph nodes in the neck when planning an operation or oncological treatment.

Aims:

Considering the complexity of the anatomy of the mentioned area, it is important to have a good knowledge of the division and names of important anatomical areas of the neck, such as drainage groups of lymph nodes, and to distinguish between operable and inoperable diseases. In the preoperative and postoperative procedure, it is important to know the meaning of local and regional disease, because it depends on the planning of treatment, i.e. recurrent tumor growth in the postoperative monitoring procedure.

Methods:

CT imaging of the oral cavity and oropharynx can be performed in one short breath hold or even with the patient breathing normally. All studies should be reconstructed in soft tissue and bone algorithms. It is essential to remove all metal structures that can be removed from the oral cavity. Coronal and sagittal images are necessary for the analysis of structures located in the axial plane. Intravenous contrast increases the visibility of pathology and is essential for the evaluation of cervical lymph nodes.

Results:

This lecture will present different examples of patients with squamous cell carcinoma of the oral cavity and oropharynx.

Conclusion:

The meaning od this lecture refers to importance of technical issues related to CT imaging review, cross-sectional anatomy, patterns of tumor spread, and the role of imaging in pretreatment staging and posttreatment surveillance of oral cavity and oropharyngeal carcinoma. We will explain in detail the complexity of anatomy, the importance of pathological changes and how to structure a radiology report.

ABSTRACT

Authors: Marin Štefančić1; Zdravka Krivdić Dupan2,3
Akademska bolnica Uppsala, Švedska; KB Dubrava, Zagreb

1 – Odjel za radiologiju, Nacionalna memorijalna bolnica ˝Dr. Juraj Njavro˝ Vukovar, Vukovar, Republika Hrvatska
2 – Klinički zavod za dijagnostičku i intervencijsku radiologiju, Klinički bolnički centar Osijek, Osijek, Republika Hrvatska
3 – Medicinski fakultet Osijek, Sveučilište J. J. Strossmayer Osijek, Osijek, Republika Hrvatska

NEUROIMAGING PACIJENTA S GLAVOBOLJOM UVJETOVANOM PROMJENAMA INTRAKRANIJSKOG TLAKA – IIH vs SIH (PRIKAZI SLUČAJEVA)

Uvod:
Idiopatska intrakranijska hipertenzija (IIH) i spontana intrakranijska hipotenzija (SIH) su stanja uvjetovana povišenjem, odnosno sniženjem intrakranijskog tlaka (ICP). I dok je etiologija IIH nepoznata što propituje točnost Monro-Kellie doktrine, uzrok SIH je spontani gubitak cerebrospinalnog likvora (CSL). Oba stanja pojavljuju se češće u žena, a IIH se povezuje i s porastom BMI. Postavljanje dijagnoze zahtijeva multidisciplinaran pristup pacijentu, a neuroradiološke slikovne metode, kompjuterizirana tomografija (CT) i magnetska rezonancija (MRI), neizostavan su dio dijagnostičkog hodograma.

Cilj:
Osvijestiti neuroradiološke znakove SIH i IIH, posebice s obzirom na porast incidencije IIH, a koje nerijetko ostaju neprepoznate čime izostaje i postavljanje dijagnoze.

Metode:
MRI studije u pacijenata s glavoboljom učinjeni u Kliničkom bolničkom centru Osijek.

Rezultati:
Prvi slučaj prikazuje 15-godišnju djevojčicu koja je upućena u hitnu pedijatrijsku ambulantu nakon oftalmološkog pregleda gdje se utvrdi edem papile s parezom lijevog n. abducensa i umjernom glavoboljom uz postupnu progresiju pareze desnog n. abducensa. Iako početna neuroradiološka obrada biva nesigurnog zaključka, u konačnici se postavi sumnja na IIH, te se pacijentica tretira neurokirurški pri čemu dolazi do poboljšanja kliničke slike. Drugi slučaj prikazuje 45-godišnju pacijenticu s tupom zatiljnom glavoboljom rezistentnom na analgetike koja se pojačava u stojećem položaju, bez ispada u neurološkom statusu. Petnaestog dana bolesti u pacijentice se javljaju horizontalne dvoslike koje upućuju na leziju n. abducensa, te tinitus. Učinjenom neuroradiološkom obradom detektira se voluminozna hipofiza s horizontalnije svedenim infundibulumom i postkontrastna duralna imbibicija koje sugeriraju SIH.

Zaključak:
Pri obradi pacijenata s glavoboljom uvjetovanom promjenama intrakranijskog tlaka, neuroradiološke metode, posebice MRI, neizostavni su dio dijagnostičkog hodograma kojim je potrebno isključiti sekundarne uzroke intrakranijske promjene tlaka (tumori, krvarenja, frakture sinusa, ijatrogeni uzroci i sl.) te prepoznati neuroradiološka obilježja IIH i SIH što će, korelativno s kliničkom slikom, pridonijeti uspostavi dijagnoza.

ABSTRACT

Authors: Kresimir Dolic

University hospital Split, Croatia

IMAGING OF SKULL BASE TUMORS

Abstract:

The skull base is a complex and challenging anatomical region due to the presence of crucial neurovascular structures that enter and exit the cranial vault. Owing to its deep location, it is not amenable to direct clinical examination aside from surgical exploration. There are various benign and malignant entities as well as tumor mimics that may arise from the skull base and surrounding structures, which pose diagnostic and therapeutic challenges. Radiologic imaging is the cornerstone for detection, differential diagnosis, treatment planning, and follow-up of skull base tumors. CT and MRI are the primary imaging modalities and complement each other in narrowing the differential diagnosis and planning treatment. They are used for lesion detection, tissue characterization and assessment of neurovascular and bone involvement by the lesions. CT is the modality of choice for the delineation of fine bony detail, detection of matrix calcification, and identification of aggressive features, such as bone destruction and erosion. MRI should be performed at a minimum of 1.5 Tesla and ideally at 3.0 Tesla, as the latter provides a higher signal-to-noise ratio, which is important to resolve small structures, provide lesion detail, and identify perineural disease. The aim of this lecture is to review pertinent clinical issues, typical imaging appearances and certain imaging variations of common skull base lesions.

Authors: Božo Ćrčija dr. med., Ilenija Romić.dr.med., Marina Drobac.dr. med. ,Ana Ivanišin Barać dr med.

OB. DUBROVNIK, OB. Dubrovnik

Beeng Neel sindromom.Važnost slikovnog prikaza u multidisciplinarnom pristupu rane dijagnoze , terapijskom praćenju i prikaz slučaja.

UVOD: Beeng Neel syndrom(BNS) je rijetka manifestacija i javlja se u 1% oboljelih od Waldenstrom makroglobulinemije (WM). Waldenström makroglobulinemija (WM) je rijetka limfoproliferativna bolest,po klasifikaciji limfoplazmatski limfom kojeg karakterizira B stanična infiltracija koštane srži i limfnog tkiva te serumska prisutnost IgM monoklonalne gamapatije. Prikaz slučaja 65 godišnje pacijentice kojoj je prije pet godina dijagnosticirana Waldenstrom makroglobulinemija(WM), a nanovo hospititalizirana zbog novonastale unilateralne pareze nervus facijalisa, ataksije, slabljenja obje ruke i šake.

CILJ: Prezentacija u svrhu isticanja važnosti uloge uloge MR pregleda mozga i čitave kralježnice u postavljanju BNS dijagnoze te praćenja terapeutskog odgovora .

METODE: Postoje različiti protokoli za MRI skeniranje CNSa no svakako potrebno je uključiti fluid attenuated inversion recovery(FLAIR) i T1 sequenca prije i nakon aplikacije kontrasnog sredstva gadolinija.

Zlatni standard u dijagnozi BNS u pacijenata sa WM stanicama u CSF ili manje česti

dostupno biopsija tkiva .

REZULTATI: Pacijentice koja zadnjih 5 godina boluje od WM hospitalizirana zbog novonastalog centralnog neurološkog ispada u vidu unilateralne pareze nervus facijalisa, ataksije, slabljenja obje ruke i šake .

Osim pozitivnog radiološkog nalaza dijagnoza BNS se potkrijepi i pozitivnim nalazom cerebrospinalne tekućine(CSF)- citologije i protočne citometrije.

Nalaz MRI mozga i čitave kralježnice je pokazivao nježnu postkontrasnu imbibiciju uz lijevi n.facijalis i ekstenzivnu leptomeningalnu imbibiciju u vratnom i torakalnom segmentu kralježnice, te uz caudu equinu. Po hematološkom konziliju provedena je terapija ibrutinibom u 4 ciklusa sa potpunom regresijom neuroloških ispada i radiomorfološkom regresijom u MRI prikazu leptomeningealne imbibicije uz lijevi n.facijalis i infiltracije leptomemingi u vratnom ,torakalnom segmentu i uz kaudu equinu.

ZAKLJUČAK: Postavljanje kliničke sumnje BNSa i ranog MRI snimanja čitavog CNSa u pacijenata sa WM pri klinički novonastalom neurološkom ispadu zbog pravovremenog uvođenja dostupne terapije bitno,umanjuje postojeće simptome,produžuje period bez simptoma te dužinu i kvalitetu života oboljelih pacijenata.Dijagnoza,liječenje i praćenje BNSa je izazov koji nužno uključuje multidisciplinarni pristup hematologa,neurologa,neuroradiologa i patologa i referentnog hematološkog nacionalnog centra.

ABSTRACT

Authors: Martina Špero, Affidea Čavka

How tough is the touhg body?

UVOD: The corpus callosum, or the tough body, is the primary commissural region of the brain consisting of white matter tracts that connect the left and right cerebral hemispheres. Although there is considerable variability in the size and shape of the corpus callosum in humans, it is known that it contains approximately 200 million fibers that carry neural signals from one side of the brain to the other. The primary function of the corpus callosum is to integrate and transfer information from both cerebral hemispheres to process sensory, motor, and high-level cognitive signals. The corpus callosum has been implicated in many different pathology types. Using three categories, tough, tougher, the toughest I will take you to a short journey through the neuroradiology of different types of pathology processes that could involve tough body from the congenital, through vascular, demyelinating, trauma, primary brain neoplasms, to infections, toxic and acquired metabolic lesions. Going through cases from everyday practice in which corpus callosum was involved, I will present „radiology in a nutshell of the corpus callosum“ and prove how tough it corpus callosum could be.

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ABSTRACT

Authors: Martina Špero, Affidea Čavka

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ABSTRACT

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IS THE INCREASE IN LIMBIC LOBE VOLUMES A PATTERN OF NEUROPLASTICITY IN CHEMOBRAIN?

Introduction:"Chemobrain" or "chemofog" represents disorders in cognitive functioning in patients during and after chemotherapy. There are various suspected mechanisms behind this phenomenon, including neuronal inflammation, oxidative stress and alterations in normal neuronal processing. Non-brain chemotherapeutic drugs usually fail to cross the blood-brain barrier. Still, the inflammatory cytokines are released and probably trigger the low-level neuroinflammation that leads to reduction in neurogenesis and gliogenesis, as well as in neurotransmitter release. The natural reversibility of the process is observed in functional recovery, but the underlying mechanism of brain plasticity is not well understood.

Aim: The main aim of the study was to explore volumes of brain structures immediately after cytostatic therapy for breast cancer and to correlate the findings with the results of neurocognitive assessment (Mini Mental Score Examination, MMSE).

Methods: The study included 33 patients, mean age 56.9 years, with histologically verified invasive breast cancer, who underwent adjuvant or neoadjuvant cytostatic chemotherapy for breast cancer (doxorubicin/cyclophosphamide). Magnetic resonance imaging (MRI) of the brain was performed in all patients prior to and after the therapy, including 3D MPRAGE isotropic tomograms, suitable for MR volumetry. Concomitant neuropsychological assessment was performed. Statistical analysis was performed using paired t-test and significance level was set at $p<0.05$.

Results: A statistically significant increase was observed in the volumes of left amygdala and total hippocampus ($p<0.05$, 0.98 vs. 1.01, and 8.12 vs. 8.18) as well as in the right occipital lobe ($p<0.05$, 33.88 vs. 34.33) prior and after chemotherapy; additionally, the volumes of the limbic lobes also showed a significant increase after therapy ($p<0.05$, 38.04 vs 38.63). MMSE showed no significant decrease and no signs of global cognitive impairment in our patients ($p<0.05$; 28,60 vs. 28.96).

Conclusion: The increase in limbic lobe structures was an unexpected finding early after completion of chemotherapy in patients with breast cancer. Since these particular regions have a role in neurogenesis in adults, this finding might be a framework for neurogenesis-dependent plasticity. However, the role of psychological stress that is processed via limbic system pathway can not be neglected and the participation of stress-induced enlargement has to be taken into account.

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IMAGING EVALUATION OF RADIATION NECROSIS OF THE BRAIN: PEARLS AND PITFALLS

Introduction: Brain magnetic resonance imaging (MRI) exam plays a pivotal role in the initial and follow-up assessment of brain tumors. The correct imaging identification of radiation induced tumor changes is essential for the adequate treatment of patients. Radiation necrosis is a delayed complication of radiotherapy and represents the main imaging challenge to make a differential diagnosis toward tumor recurrence. The aim: To give an insight into the most common pearls and pitfalls in the diagnosis of radionecrosis on brain MRI.

Methods: Conventional and advanced MRI sequences are commonly used for the assessment of post radiotherapy changes of brain tumors. In this study the pearls and pitfalls encountered during the imaging evaluation of patients treated with irradiation for primary and secondary brain tumors were described.

Results: Pitfalls:

-Overlapping imaging appearances: tumor progression and pseudoprogression can give similar appearances on imaging, thus it is difficult to make a clear distinction between these entities. The presence of similar imaging findings may lead to wrong conclusions.

-Diffusion MR: must be interpreted with caution because hypercellularity and coagulative necrosis can both give restricted diffusion.

-MR spectroscopy: initially observed as a promising tool since it gives an insight into metabolic tissue features, must be interpreted with caution.

Pearls:

-Timeline of appearance: time chart and precise definition of time passed from irradiation can help distinguish radiation necrosis from true tumor progression / pseudoprogression.

-Volume changes over time: radionecrosis shrinks, tumor progression expands, pseudoprogression shrinks/disappears.

-Perfusion MR: alone or in combination with diffusion MR can give the most accurate definition of the underlying process but can highly depend on the time passed from the treatment. In general, low perfusion coefficients favor radionecrosis, whereas high coefficients favor tumor progression.

-Contrast enhancement: “Swiss-cheese”, “soapbubbles”, “cut-green pepper” patterns favor radionecrosis, but remain one of the least specific imaging signs.

Conclusion: Radionecrosis is commonly encountered radiotherapy change. The precise distinction between different radiotherapy induced changes is necessary in order to guide treatment decisions. The shortcomings of conventional MRI are well known, thus advanced MR techniques and hybrid imaging must be implemented in routine radiological management of these patients.

ABSTRACT

Authors: Ana Muldini Dragoja, Grško Šimić Ivana , Petrić Sabolski Ana, Pudić Ivica , Rubil Danijela

Opća bolnica "Dr Josip Benčević " Slavonski Brod, Opća bolnica "Dr Josip Benčević " Slavonski Brod, Opća bolnica "Dr Josip Benčević " Slavonski Brod, Opća bolnica "Dr Josip Benčević " Slavonski Brod, Opća bolnica "Dr Josip Benčević " Slavonski Brod

Tuberkulozni spondilitis – vraća li se stara bolest u novom ruhu ?

UVOD: Povećanjem migracija stanovništva i narušavanjem životnih uvjeta stanovništva ali i sve više onkoloških imunokomprimitiranih bolesnika tuberkuloza raste u svojoj učestalosti. Tuberkulozni spondilitis , oblik spinalne tuberkoluze izazov je u dijagnostici zbog često nespecifičnih i neprepoznatih simptoma . Magnetna rezonanca igra važnu ulogu u dijagnostičkom procesu od postavljanja dijagnoze do praćenja učinka liječenja

CILJ: Ukazati na atipične radiološke znakove tubekuloznog spondilitisa u prikazu magnetnom rezonacom

METODE: Kroz kratki prikaz slučajeva iz naše prakse i pregled literature cilj je ukazati na atipične manifestacije u prikazu magnetnom rezonancom ove u zadnje vrijeme sve učestalije bolesti .

REZULTATI: U tipičnom oblik tuberkulozni spondilitis manifestira se destrukcijom dva susjedna kralješka, pripadajućih pokrovnih ploha i intervetrebralnog diska te širenjem u okolna meka tkiva, kompesijom prema spinalnom kanalu i formiranjem paravertebralnog apsesa.

Atipične radiološka slika uključuje preskakanje kralježaka, razaranje posteriornih elemenata kralježnice, prisutnost samo koštanog edema ili samo lezije unutar kralješka bez frakture istog te očuvanost intravertebralnog diska. Upravo u ovakvim slučajevima važnost je radiologa posumnjati u tuberkulozni spondilitis ali i razmotriti ostale diferencijalne dijagnoze – prvenstveno metastaze, brucelozni i piogeni spondlitis, sarkoidozu te primarni limfom kralježnice.

Prikazat ću 10 slučajeva iz naše prakse i pregleda literature s tipičnim i atipičnim radiološkim manifestacijama tubekuloznog spodilitisa .Također ukazati koliko osim stadardnog protokola MR snimanja od pomoći u difrerencijalnoj dijagnozi mogu biti dodatne sekvence -DWI i spektroskopija.

ZAKLJUČAK: U slučaju tipičnog radiološkog nalaza brzo i lako se postavlja dijagnoza. Kod atipičnih radioloških slučajeva važno je postaviti sumnju i diferencijalnu dijagnozu kako bi se pravovremeno napravila slikovno vođena ili kirurška biopsija i započelo liječenje.

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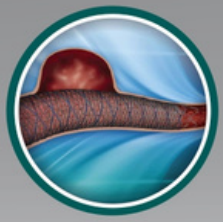

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ABSTRACT

Authors:Nikola Boban, Andrej Petreš, Dalibor Ilić, Slobodan Torbica, Vedran Žigić, Viktor Till, Sanja Stojanović, Dragan Anđelić, Željko Živanović

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MEHANIČKE TROMBEKTOMIJE U POSTERIORNOJ CIRKULACIJI -ISKUSTVO UNIVERZITETSKOG KLINIČKOG CENTRA VOJVODINE

UVOD: Procedura mehaničke trombektomije (MT) se u Univerzitetskom Kliničkom Centru Vojvodine (UKCV) sprovodi od 2016. godine. Iako je većina intervencija izvedena kod pacijenata sa akutnim ishemijskim moždanim udarom (AIMU) u anteriornoj cirkulaciji, kod 26 pacijenata je MT primenjena kod AIMU u posteriornoj cirkulaciji.

CILJ: Cilj rada je prikaz i analiza rezultata procedure mehaničke trombektomije u posteriornoj cirkulaciji u UKCV.

METODE: Selekcija pacijenata je zasnovana na produženom vremenskom prozoru za terapiju u posteriornoj cirkulaciji (do 8h), uz CT/CTA pregled i pc-ASPECTS skor; kod dva pacijenta uradjen je i MR pregled u uslovima „wake-up stroke".
Kod 16 pacijenata je načinjen kombinovani tretman uz prethodnu intravensku trombolizu. Strategija pristupa je u većini slučajeva podrazumevala prvi pokušaj trombektomije tehnikom aspiracije u cilju manje invazivnosti, ali je u značajnom broju intervencija do kraja bila korišćena stent-retriever ili kombinovana tehnika.

REZULTATI: U većini slučajeva uzrok AIMU je bila izolovana okluzija AB ili kombinovana AB/SCA ili AB/ACP okluzija (14 odnosno 9 pacijenata), dok je kod 3 slučaja bila okludirana AV. Postignuta je zadovoljavajuća stopa reperfuzije kod 19 pacijenata (73%) (definisana kao TICI ≥2b), kod 8 pacijenata iz prvog pokušaja. Kod 2 pacijenta je postizan inicijalni parcijalni uspeh ali uz brzo ponovno okludiranje krvnog suda unutar 2-3 minuta, verovatno usled podležeće lezije endotela i generisanja nove tromboze, bez kasnije uspešne rekanalizacije. Kod jednog pacijenta je nakon inicijalne uspešne intervencije sa TICI3 ishodom i kliničkim poboljšanjem došlo do reokluzije nakon 17h, koja je tretirana ponovnom MT uz dobar radiološki i klinički ishod. Kod 7 pacijenata nije postignuta zadovoljavajuća rekanalizacija. Učestalost komplikacija nije značajno odstupala od anteriorne cirkulacije. Klinički ishod nakon 3 meseca je u celini bio lošiji u odnosu na iskustvo iz anteriorne cirkulacije-11 pacijenata (42%) je imalo mRS 0-3 nakon 3 meseca, a zabeleženo je 6 smrtnih ishoda.

ZAKLJUČAK: Mehanička trombektomija u posteriornoj cirkulaciji daje visoku stopu rekanalizacije, ali uz klinički lošije ishode nego u anteriornoj cirkulaciji. Uočena je veća učestalost podležeće disekcije i ateroskleroze, kao i veća učestalost mladjih pacijenata u odnosu na pacijente sa AIMU u anteriornoj cirkulaciji.

ABSTRACT

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Olfactory Dysfunction and Volumetry of Olfactory Bulbs After COVID-19

UVOD: Olfactory dysfunction is one of the most common symptoms of SARS-CoV-2 virus infection. Abnormalities in olfactory bulbs, primarily volume reduction, as observed through imaging, may suggest a central cause.

CILJ: The aim of this study was to compare olfactory bulb volumes in patients with SARS-CoV-2 virus infection, both with and without olfactory dysfunction symptoms, and to correlate these volumes with parameters on the depression scale.

METODE: Ninety patients, aged 18 to 65, were divided into three groups of 30 based on the severity of the acute-phase SARS-CoV-2 virus infection, after completing a questionnaire about olfactory disability. Patients underwent brain MRI 6 to 12 months after the acute infection period. Manual segmentation and volumetry of the olfactory bulbs were performed using the 3D-T1 magnetization-prepared rapid gradient-echo (MPRAGE) and the 3D-T2 sampling perfection with application-optimized contrast using different flip-angle evolutions (SPACE) MRI studies for precise anatomical visualization. Depression and anxiety were assessed using Beck's Depression Inventory II (BDI-II) and the Depression Anxiety and Stress Scale 21 (DASS-21).

REZULTATI: We observed a significant correlation between olfactory bulb volume and reported olfactory dysfunction during the acute phase of infection ($p = 0.048$), where larger volumes were associated with dysfunction. There were no significant differences between right and left bulb volumes in relation to dysfunction ($p = 0.51$ and $p = 0.077$ for the left and right sides, respectively). No correlation was observed between total olfactory bulb volume and depression scores (p-values of 0.643, 0.898, and 0.783 for BDI-II, depression, and anxiety DASS-21 subscales, respectively).

ZAKLJUČAK: Patients who reported olfactory dysfunction symptoms during the acute phase of SARS-CoV-2 infection showed larger olfactory bulb volumes 6 to 12 months later, while there was no observed correlation between bulb volumes and self-assessment depression and anxiety scores. This volume increase might favor neuronal plasticity as a salvage attempt to repair the injury induced by COVID-19 infection. Longitudinal studies are necessary to follow the individual trajectory of neuronal reparation in correlation with patients' symptoms and to clear the findings from this study.

ABSTRACT

Authors: Smoljan Basuga Mia, Klemenčić Antonio, Flegarić-Bradić Mirjana, Rihtar Tamara, Prenc Matea

KBC Sestre milosrdnice, KBC Sestre milosrdnice, KBC Sestre milosrdnice, KBC Sestre milosrdnice, KBC Sestre milosrdnice

DENTAL RADIOLOGY AT A GLANCE

UVOD: Dental radiology is a part of Head & neck radiology which is still relatively unfamiliar among the medical doctors and radiologists. In Croatia, as in many other countries, the analysis of X-rays and CT scans of the jaws is usually performed by dental medicine doctors alone. On the other hand, the maxillofacial region is included in the head & neck scans and also often seen on other neuroradiological examinations (e.g., brain and cervical spine scans). Therefore, the radiologists can come across different odontogenic and non-odontogenic lesions of this area in their everyday practice.

CILJ: The aim of this presentation is to give a pictorial review of the most common pathologies found in maxillofacial region.

METODE: A lot of maxillofacial structures, especially the upper jaw and the temporomandibular joints, are visible on most brain scans. Head & neck scans usually include the whole maxillofacial area. When analyzing these images, radiologists should pay attention to these structures as well.

REZULTATI: Whether the indication for the radiological examination is to diagnose an already suspected dental/maxillofacial pathology or the pathology found is an incidental finding in the examination performed for other indications, the radiologists should be familiar with the nomenclature, the lesions typical for this region, and their differentials.

ZAKLJUČAK: Odontogenic and non-odontogenic lesions of the jaws, as well as other maxillofacial pathologies, account for a substantial number of pathological changes visible on radiological examinations. Adding them to the radiological reports may assist the clinicians solve the clinical inquiry and help the patient maintain their oral health.

ABSTRACT

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METOTREXATE INDUCED LEUKOENCEPHALOPATHY IN PATIENT WITH PRIMARY CNS LYMPHOMA - CASE REPORT

Introduction: One of the most serious side effects of systemic methotrexate chemotherapy is acute leukoencephalopathy. The risk of leukoencephalopathy is dose-dependent and intrathecal administration carries a higher risk than intravenous administration. It occurs 2-14 days after the applied therapy with symptoms similar to other encephalopathies. In some cases leukoencephalopathy can be asymptomatic with only radiographic changes present. Magnetic resonance imaging (MRI) shows diffuse signal abnormalities on T2-weighted and FLAIR sequences. Diffusion restriction caused by cytotoxic edema can be detected, which disappears along with resolution of symptoms. On post-gadolinium MRI images abnormal contrast enhancement may or may not be seen.
Aim: Case report.
Methods: Pictorial review of the case.
Results: A 79-year-old patient reported symptoms of dizziness, instability and diplopia. CT-scan showed hyperdense mass in the anteroinferior aspect of the vermis, the right cerebellar peduncle and along the posterior wall of the fourth ventricle, with postcontrast enhancement. MRI, which was preformed 5 days later, showed discrete mass with contrast enhancement in the same area without correlate on other sequences and was overlooked. Two months later patient reported worsening diplopia. Follow-up MRI showed T2-weighted and FLAIR hyperintense mass with contrast enhancement in the same area. Surgical biopsy proved diffuse large B-cell lymphoma. Therapy according to the R-HDMTX (High-dose methotrexate) protocol was started. Three weeks later patient developed horizontal nystagmus and ataxia. Follow-up MRI showed volume increase of previously described lesion, with diffusion restriction and postcontrast enhancement. Confluent zones of periventricular hyperintensity were also seen, resulting from toxic leukoencephalopathy caused by methotrexate. Progression of the global cerebral atrophy and dilatation of the ventricular system was also detected. Further treatment with methotrexate is abandoned and patient is being considered for radiotherapy.
Conclusion: High-dose methotrexate in treatment of primary CNS lymphoma can cause significant clinical neurotoxicity and leukoencephalopathy.

ABSTRACT

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THE PRESENCE OF COMMUNICATING ARTERIES IN THE CIRCLE OF WILLIS IS ASSOCIATED WITH HIGHER RATE OF FUNCTIONAL RECOVERY AFTER ANTERIOR CIRCULATION ISCHEMIC STROKE

Introduction: Acute ischemic stroke (AIS) is the world's second leading cause of mortality. An established method for treating stroke patients in acute settings is endovascular therapy (EVT). However, the correlation of successful endovascular treatment of AIS with the presence of communicating arteries in the circle of Willis needs to be proven.

Aim: We hypothesised that the presence of ACoA or PCoA affects functional outcomes after mechanical thrombectomy.

Methods: In this study, we examined clinical and radiological data of 158 consecutive patients treated with mechanical thrombectomy (MT) at our comprehensive stroke center. We analyzed their CT angiograms and digital subtraction angiography (DSA) to assess anatomical variants of Willis' circle and formed two groups - collateral-negative and collateral-positive group. The first group included patients with aplasia of both Anterior (ACoA) and Posterior Communicating Artery (PCoA). The second group included patients having at least one communicating artery (either Anterior or Posterior). We evaluated their reperfusion outcomes and functional recovery three months later.

Results: Patients with communicating arteries had smaller areas of infarction on post-interventional CT and higher rates of functional recovery (Modified Rankin Score). The ACoA had a higher impact on early and late outcomes, confirmed by lower control CT scores and more favorable functional recovery.

Conclusion: Anatomic variants of Willis' circle should be considered as a significant prognostic factor in AIS.

ABSTRACT

Authors: Dina Miletić Rigo, Kristijan Stojčić, Tin Nadarević, Slavica Kovačić, Damir Miletić
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VBQ and T1 lumbar spine score correlation with DEXA as prediction factors for osteoporosis in operated patients

UVOD: Bone quality is the key individual risk factor for vertebral compression fractures and is directly related to optimal outcomes of spinal surgery. Osteoporosis has significant impact on spinal fusion surgery, as reduced bone mineral density (BMD) can result in complication and poor surgical outcome. In routine clinical practice, bone density is assessed by dual x-ray absorptiometry (DEXA), however it has been noted that DEXA overestimates BMD in patients with obesity and degenerative changes. Recently, MRI-based vertebral bone quality (VBQ) score and T1 values have showed potential to accurately assess and grade reduced BMD.

CILJ: The aim of this study was to evaluate the correlation between spine VBQ and T1
values with DEXA BMD measurements.

METODE: This study includes 28 patients with simptomatic degenerative changes in the lumbar spine, who underwent surgical treatment in our institution in the last three years from 2021. to 2023. As part of the diagnostic workup, DEXA, conventional and synthetic MRI of the spine were performed. Using SyngoVia software (Siemens Healthineers), manual measurements of the T1 values were performed on each lumbar vertebra, and VBQ values were calculate using in-house developed software for spine segmentation and VBQ measurements (Images 1 - 3). The reference standard was DEXA T score.

REZULTATI: Our research confirms that VBQ score correlates with DEXA T score in osteoporotic group in 81% (16 patients with T score values of osteoporosis correlates with 13 VBQ scores) and osteopenic group in 100% (4 patient). Three patients did not correlate in scores (DEXA/VBQ), one of the probable reasons is longer period time between exams. Normal bone quality was present in four patients and there were no
postoperative complications in patients with regular VBQ score.

ZAKLJUČAK: Osteoporosis is significant risk factor for complications after surgery (vertebrosynthesis) on the spine, therefore the preoperative evaluation of BMD is essential information in treatment of a patient that should be implemented in the planning of surgical treatments of the spine.

ABSTRACT

Authors: Kraljević Ivan, Lovrić Kojundžić Sanja, Sablić Sara, Marinović Guić Maja

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Hirayama Disease In An Adolescent Male: A Case Report

UVOD: Hirayama disease (HD) is a rare neurological condition characterized by insidious unilateral or bilateral muscular atrophy and weakness of forearms and hands without sensory or pyramidal signs. This usually progresses for one or two years before plateauing and eventually showing an abrupt arrest. The disorder is caused by limited dural sac laxity, which causes chronic ischemic changes to the anterior horn cells of the cervical spine. It has been demonstrated that early intervention reduces disability and limits progression of the disease.

CILJ: We will present a case of HD in a 16-year-old male with characteristic findings from flexion magnetic resonance imaging (MRI).

METODE: A 16-year-old male presented to pediatric rheumatology after frequent subfebrile episodes and weakness in his left hand for the last 2 months. Physical examination as well as laboratory findings were unremarkable. Symptomatic therapy was recommended for subfebrile episodes and physical therapy for hand weakness. Three months later, after completing physical therapy, there was no improvement in his hand, but had deteriorated even further, and muscle atrophy was evident. Electromyoneurography of upper extremities showed severe neural lesion of myotome C8 (T1), and moderate lesion of C6 and C7 on the left side. Further tests were ordered to find the possible cause (brain MRI, cervical spine MRI, brachial plexus MRI, left forearm MRI), but none exhibited any lesions. Additional physical therapy was suggested, but it was dismissed by the patient

REZULTATI: On a follow-up cervical spine MR, it was proposed to acquire scans in anteflexion at 18°. It demonstrated an asymmetrically more voluminous left posterior epidural space caudal from the C5 level. The changes were most noticeable at level C6–C7, where the width of the epidural space measured up to 6 mm. Consequently, the cervicothoracic medulla was semicircularly compressed inside the spinal canal. A discrete spindle-shaped impression of the specified medulla segment with discrete punctiform central T2 hyperintensity within the medulla spinalis was seen. Described changes can correspond to HD.

ZAKLJUČAK: It is important to keep in mind such insidious, rare neurological disorders in a setting with seemingly no radiological findings, but severe physical symptoms.

ABSTRACT

Authors: Kraljević Ivan, Lovrić Kojundžić Sanja, Sablić Sara, Marinović Guić Maja

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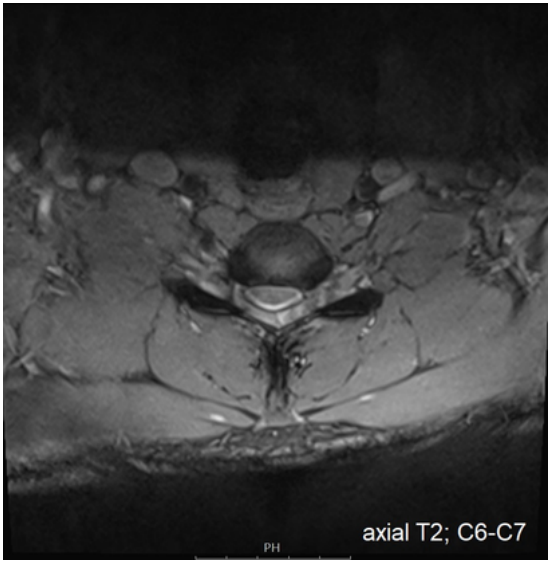

ABSTRACT

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Imaging of acute head and neck infections and inflammations

INTRODUCTION

Infections are among the most common pathological processes that affect the head and neck region and are particularly important due to their acute, severe, and potentially life-threatening nature. Infection of the deep neck spaces is a life-threatening acute condition that requires prompt diagnosis and treatment.

AIM

The purpose of this presentation is to describe and to review the imaging appearances of acute head and neck infectious and inflammatory diseases. Our aim is to review the most common severe infections that arise in the head and neck region with examples from our institutions along with their imaging features, potential complications and treatment options.

METHODS

Imaging plays a crucial role in evaluating the head and neck infections by determining the location and extent of disease and identifying complications. Computed tomography (CT) is the procedure of choice in the setting of emergency department, while magnetic resonance imaging (MRI) offers superior soft tissue resolution and therefore is the best method for imaging neck infections.

RESULTS

Emergency neck imaging has traditionally been performed using the contrast-enhanced CT. However, its disadvantages are the limited soft tissue contrast resolution, uncertainty in separating purulent from non-purulent fluid collections, and artifacts from bone and dental implants.

MRI has proven to be an accurate, and reliable imaging method in deep neck infections. It has excellent soft tissue discrimination, doesn't involve ionizing radiation and therefore is a promising alternative imaging modality of acute neck infections.

CONCLUSION

CT and MRI are the cornerstone of imaging in case of severe head and neck infections. The knowledge of imaging findings of most common infective entities is mandatory for every radiologist in the emergency department.

ABSTRACT

Authors: Milos A. Lucic1,2, Martina Spero3, Silvija Lucic1,4

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AI & NEURORADIOLOGY: WITNESSING THE HISTORY OF THE FUTURE

Abstract body:
Artificial intelligence (AI) is starting to reshape not only radiology and neuroradiology, but also the very fabric of human civilization and the world as we know and recognize. If the singularity would be considered as a time point where the creation of intelligence larger than human arises, then probably this time point may be imminently in front of us, or perhaps already reached. Anyhow, AI is already widely entering into the imaging field, changing and challenging our daily routine and concepts in radiology. Upcoming changes of our radiology profession are accelerated by rapid technological advances, most probably without any possibility to be brought to a standstill or even less likely stopped ever again. Therefore, to understand the impact of AI to diagnostic imaging may appear an issue of utmost importance in the very near future. In the light of many current and novel technologically performable applications and techniques, in this brief review we will try to lighten out some of the possible directions that may suggest where could the advance of technology lead our daily practice in (neuro)radiology, but also how the expected further development of AI may irreversibly impact the (neuro)radiological profession in the near future.

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ABSTRACT

Authors: Mirjana Flegarić-Bradić1*, Tamara Rihtar1, Mia Smoljan Basuga1, Tomislav Gregurić1, Antonio Klemenčić1, Matea Prenc1, Mia Ljevak Vidović2

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CT and MRI are the cornerstone of imaging in case of severe head and neck infections. The knowledge of imaging findings of most common infective entities is mandatory for every radiologist in the emergency department.

ABSTRACT

Authors: Stojanoski Stefan, Boban Jasmina, Koprivšek Katarina, Lučić Miloš, Kozić Duško

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CT and MR Imaging Findings of Lingual Nerve Perineural Spread

UVOD: In the general population, there has been an increase in the elderly population, and that increase was followed by an increased frequency of neurodegenerative diseases. With MRI it is not always possible to completely differentiate physiological aging from subclinical forms of dementia.

CILJ: The main goal of this study was to determine if the volumes of brain structures decrease during the lifespan, to what extent, and if is really a consequence of aging. Also, the goal was to determine if there are gender differences in the volumes of brain structures and if they can be directly connected with aging.

METODE: The study group was composed of 40 healthy individuals who were, based on age, divided into two groups, a younger average age of 26,75 +/-2,47 SD, and an older group, averaging 68,5 +/-5,26 SD years. All patients were scanned on MRI and volumes of their brain structures were calculated by voxel-based morphometry.

REZULTATI: In the group of older patients there was significant decrease of total cerebral volume ($p<0.001$), total gray matter volume ($p< 0,0001$), total white matter volume ($p<0,024$), average thalamic volume ($p<0,0001$), average putamen volume ($p<0,0001$) and average caudate volume ($p<0,004$), while the average volumes of lateral venticles were increased ($p< 0,002$). Statistically significant negative corelation was found between age and total cerebral volume ($p<0,001$), total gray matter volume ($p<0,001$), total white matter volume ($p<0,05$), average thalamic volume ($p<0,001$), average putamen volume ($p<0,001$) and average caudate volume ($p<0,001$) as well as statistically significant positive correlation between age and average volumes of lateral ventricles ($p<0,001$). With the linear statistical analysis there was found, but only In the group of younger patients, there was statistically significant positive correlation between age and total cerebral volume ($p<0,001$), total gray matter volume ($p<0,05$), total white matter ($p<0,001$), average thalamic volume ($p<0,001$) and average putamen volume ($p<0,001$).

ZAKLJUČAK: Aging is followed by a significantly decreased volume of cerebrum, gray and white matter, thalamus, putamen, and caudate, and by a significantly increased volume of lateral ventricles. These changes are a consequence of aging, but the effect of the other factors cannot be excluded.

ABSTRACT

Authors: Andrijana Jović

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Dijagnostika patoloških stanja brahijalnog pleksusa magnetskom rezonancijom

UVOD: Brahijalni pleksus je longitudinalno usmjerena kompleksna struktura vrata koja inervira ipsilateralno rame, ruku i gornji dio toraksa. Zbog kompleksne trodimenzijalne anatomije, prikaz brahijalnog pleksusa MR-om je zahtjevan. Prikaz brahijalnog pleksusa zahtjeva poznavanje anatomije vrata, tijeka pojednih komponenti pleksusa kao i orijentaciju ravnina snimanja. Za utvrđivanje patologije brahijalnog pleksusa nužno je voditi se anamnezom i kliničkim pregledom bolesnika. Patološka stanja brahijalnog pleksusa dijelimo na traumatska i netraumatska. Traumatska dijelimo na pre- i postganglionska. Netraumatska djelimo na upalna, primarne i sekundarne tumore brahijalnog pleksusa, vaskularna, neurodegenerativna i kompresivna. Povijest prethodne traume, poznato upalno zbivanje, prethodna radioterapija, kao i trajanje tegoba uveliko nam može olakšati donošenje dijagnoze.

CILJ: Ciljevi ovog rada su prikazati anatomiju i najčeće patologije brahijalnog pleksusa primjernom MR.

METODE: Sagitalni T1 presjeci omogućavaju nam identifikaciju komponenti brahijalnog pleksusa i utvrđivanje odnosa prema okolnim mišićima i vaskularnim strukturama. Koronarne T2 sekvence, većeg područja snimanja sa saturacijom masti pružaju najviše informacija o debljini i intenzitetu signala komponenti brahijalnog pleksusa i mišića, posebice u slučajevima denervacijske atrofije mišića, te nam daju uvid u kontralateralnu stranu i tako omogućavaju komparaciju. Aplikacija kontrastnog sredstva je korisna kod upalnih zbivanja naročito u slučaju prisutnih kolekcija, kao i kod neoplastičnih zbivanja. Morfologija i orijentacija pojednih lezija također nam može dati ključan podatak, npr. ovalna dobro ograničena lezija smještena uzdužno uz živac odgovara prvenstveno tumoru ovojnica živca dok lezija smještena paralelno u odnosu na kralježnicu odgovara prvenstveno sekundarnoj infiltraciji brahijalnog pleksusa.

REZULTATI: .

ZAKLJUČAK: Anamneza i klinički status bolesnika, poznavanje ključnih anatomskih struktura vrata i radiomorfološka obilježja patoloških stanja potrebni su radiologu za donošenje uske diferencijalne dijagnoze prilikom dijagnostike patoloških stanja brahijalnog pleksusa MR-om.

ABSTRACT

Authors: Filip Samardzic

Center for radiology, University clinical center of Vojvodina

Postprocessing in fMRI studies for clinical use

UVOD: Functional MRI (fMRI) has been at the forefront of tools in understanding brain functionality for the past two decades. Acquired images for analyzing blood-oxygen level dependent (BOLD) signal in fMRI are subjected to several artifacts which should be corrected for detailed and statistically significant functional activation zones in the brain.

CILJ: Present key artifacts in clinical fMRI and potential ways of correcting them.

METODE: A variety of tools and their different combinations are used in correction of distorted images. In this paper we will list non-vendor software programs, which can be universally used.

REZULTATI: For BOLD signal acquisition, echo-planar imaging (EPI) sequence is used. This is a dynamic, whole brain, low resolution sequence with a repetition time of less than 3 seconds. Since it is a dynamic sequence, patient motion related artifacts should be corrected first and programs can perform rigid or non-rigid registration, using mostly MCFLIRT from FMRIB Software Library (FSL) or Statistical Parametric Mapping (SPM, using MATLAB).

To correct the time disparity between slices of one volume, 3dTshift (Analysis of Functional NeuroImages-AFNI) or SPM are commonly used. Thirdly, functional images should be coregistered to the anatomical images. This can be done in programs such as Advanced Normalization Tools (ANTs) or SPM. Interpretation of fMRI studies depends on accurate functional-to-structural alignment. Next step in postprocessing is smoothing, although some studies omit doing it. By decreasing the resolution, the goal is to raise the signal-to-noise ratio. Using programs like Analysis of Functional Neuro-Images (AFNI) or SPM, by setting the number of millimeters. When performing preprocessing, it would be advised to check the output data, to see the effect and redo if the output images are not of desired quality. Quality control reports are advantageous and serve to quickly assess the outcome.

ZAKLJUČAK: Postprocessing of acquired clinical fMRI images is necessary for getting higher quality results and should be carefully and standardly used. Vendor software packages can be used, but we will not discuss them in this paper.

ABSTRACT

Authors: Jasmina Plašćak

KB Merkur

UVOD: /

CILJ: /

METODE: /

REZULTATI: /

ZAKLJUČAK: Pregledno predavanje o ulozi MR-a prilikom dijagnosticiranja Menierove bolesti, potkrijepljeno primjerima iz naše prakse.

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PREMIUM ULTRASOUND FOR NEUROSURGERY

ABSTRACT

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„FRAGILNI X“ KROZ PRIZMU ADULTNOG NEURORADIOLOGA SA PRIKAZOM SLUČAJA

UVOD: Sindrom fragilnog X je najčešći nasledni uzrok kognitivne zaostalosti. Nastaje kao posledica mutacije unutar Fragile X Messenger Ribonucleoprotein 1 gena – FMR1.

Sindrom fragilnog tremora/ataksije povezanog sa Fragilnim X (FXTAS) je progresivni degenerativni poremećaj pokreta koji je posledica fragilne X premutacije i javlja se u kasnijoj životnoj dobi. U narednoj generaciji može doći do ekspanzije premutacije i nastanka pune mutacije, koja se ispoljava kao fragilni X sindrom od najranijeg detinjstva.

CILJ: Prikaz dva MR pregleda endokranijuma pacijenata sa postavljenom radiološkom sumnjom na neurodegeneraciju povezanu sa Fragile X.

METODE: Na osnovu kombinacije kliničkih i radioloških karakteristika pacijenti se mogu klasifikovati u tri grupe: definitivne, verovatne i moguće pacijente sa FXTAS. Definitivni FXTAS su oni pacijenti sa jednim major kliničkim i jednim major radiološkim, odnosno jednim major kliničkim kritirijumom i unutarjedarnim inkluzijama. Verovatni FXTAS podrazumeva prisustvo dva major klinička kriterijuma ili jedan minor klinički i jedan major radiološki kriterijum, dok je mogući FXTAS ukoliko je ispunjen jedan major klinički i jedan minor radiološki kriterijum.

Major radiološki kriterijumi podrazumevaju MRI detektovane promene bele mase u srednjem cerebelarnom pedunklu i promene bele mase u splenijumu korpusa kalozuma.

Najčešće prepoznata MR karakteristika FXRAS je „MCP“ ("Middle cerebellar peduncle") znak, koji podrazumeva T2 hiperintenzitet u srednjim cerebelarnim pedunkulima, a ujedno predstavlja i najraniji neuroanatomski marker kod asimptomatskih nosioca premutacije.

Minor radiološki kriterijumi su promene bele mase u cerebrumu i umerena do izražena globalna moždana atrofija.

REZULTATI: Kod prikazanih pacijenta su uočene patološke promena na MR pregledu endokranijuma koje zadovoljavaju jedan, odnosno oba major radiološka kriterijuma za FXRAS, uz ispunjen i jedan major klinički kriterijum u smislu postojanja intencionog tremora ruku, bez tremora u miru, koji su u trenutku pregleda bez kognitivne i bihejvioralne deterioracije

ZAKLJUČAK: S obzirom na nespecifične manifestacije bolesti i široku kliničku diferencijalnu dijagnozu pre svega intencionog tremora, te visoku cenu i tešku dostupnost genetskih analiza, radiološka slika je od velikog značaja za adekvatno postavljanje dijagnoze sugerišući kojim pacijentima je neophodna definitivna genetska potvrda.

Authors: Radić-Vukić Ana

Poliklinika Vura, OB Karlovac, Karlovac, Hrvatska

VAŽNOST MAGNETSKE REZONANCIJE U DIJAGNOSTICI SINDROMA KAVERNOZNOG SINUSA: PRIKAZ SLUČAJA

Uvod: sindrom kavernoznog sinusa (CSS) predstavlja stanje koje je uzrokovano bilo kojom patologijom ili lezijom koja uzrokuje poremećaj u funkciji anatomskih struktura kavernoznog sinusa. Važna infektivna etiologija CSS uključuje trombozu kavernoznog sinusa (CST), koja se inicijalno može prezentirati kao oftalmološki problem i zahtijeva hitno liječenje. CST se javlja kao komplikacija upalnog procesa sinusa ili zuba, a tromb koji nastane može uzrokovati lokalna oštećenja ili krvožilnim putem nastaviti prema mozgu, gdje uzrokuje simptome nalik cerebrovaskularnom inzultu, encefalitisu i meningitisu.

Opis slučaja: bolesnica od 32 godine prvi put se javlja na hitni prijem u OB Karlovac zbog smetnji vida lijevog oka, edema lijevog kapka te izrazite bolnosti lijeve sljepoočnice. Tada je konzilijarno od strane oftalmologa dijagnosticiran glaukom, dana terapija na koje se stanje popravilo. Bolesnica navodi glavobolju i bolove u vratu već nekoliko dana prije prvog pregleda. Pri prvom pregledu učini se snimanje MR-om koji pokazuje solidni ekspanzivni proces sa postkontrastnom imbibicijom, međutim bolesnica nije sklona hospitalizaciji. Nekoliko dana kasnije stanje se pogoršava te bolesnica dolazi u bolnicu vozilom HMP zbog intenzivne glavobolje i suspektnog CVI zbog naglo nastale afazije i desne facioparezе. Također, bolesnica postaje febrilna s temperaturom 39°C. Ponovljeni MR s kontrastom pokazuje progresivnu dinamiku upalnih promjena lijeve cerebralne hemisfere, dominantno fronto-temporalno, uz prikaz apscesa u području alveolarnog grebena kao mogućeg odontogenog ishodišta infekcije. Postavlja se dijagnoza upalnog procesa kavernoznog sinusa kao vjerojatno mjesto distalne embolije. Ordinirano je liječenje antibioticima bez indikacije za operativni zahvat. Bolesnica inače boluje od dijabetesa mellitusa tipa 1 i mikrocitne anemije te u kroničnoj terapiji uzima inzulin i heferol. Alergična je na penicilin.

Zaključak: septična tromboza kavernoznog sinusa rijedak je, ali životno ugrožavajući uzrok sindroma kavernoznog sinusa kojeg je potrebno što prije liječiti. U početnoj fazi bolesti simptomi mogu biti nespecifični te ukazivati na oftalmološki problem, a daljnjim razvojem bolesti simptomi nalikuju CVI-u. Od iznimne je važnosti kod pacijenata sa kliničkom slikom sindroma kavernoznog sinusa napraviti snimanje MR-om jer je ona najbolja metoda za primarno isključivanje patologije u kavernoznom sinusu.

ABSTRACT

Authors: Petar Fekete, Petra Radić, Vladimir Kalousek

KBC Sestre Milosrdnice, KBC Sestre Milosrdnice, KBC Sestre Milosrdnice

Duralne arteriovenske fistule u intervencijskoj radiologiji - pogled kroz oči specijalizanta

UVOD: Duralne arteriovenske fistule (dAVF) su patološki spojevi između duralnih arterija i duralnih venskih sinusa, meningealnih vena ili kortikalnih vena. Gotovo uvijek su idiopatske ali se u manjem broju slučajeva mogu naći kod pacijenata povezanih sa traumom, kod kojih je učinjena kraniotomija ili tromboza duralnih venskih sinusa. dAVF čine oko 10-15% svih cerebralnih vaskularnih malformacija. Najčešće lokacije su transverzalni, sigmoidni i kavernozni sinus. Klinička prezentacija je raznolika i ovisi o lokaciji i tipu dAVF, a najčešći simptomi su: pulsativni tinitus, oftalmoplegija, diplopija, retro-orbitalna bol pa sve do intrakranijalne hemoragije i nehemoragijskih neuroloških deficita. Za podjelu dAVF najčešće se koriste dva sustava klasifikacije Cognard i Borden. Tretman ovisi o klasifikaciji fistula i za niže stadije fistula se preporuča konzervativni tretman, a kod viših stadija je endovaskularni zahvat postao osnovna metoda liječenja dok se neurokirurška resekcija indicira kod pacijenata sa neuspjelim pokušajem endovaskularnog zahvata.

CILJ: Kroz ovu prezentaciju prikazali bi nekoliko zanimljivih slučajeva iz naše ustanove i put od dijagnostike dAVF pa sve do liječenja endovaskularnim zahvatom i postoperativnim praćenjem pacijenata sa ciljem boljeg upoznavanja kliničara ali i radiologija s ovom patologijom i endovaskularnim pristupom kao najboljom terapijskom metodom.

METODE: Svakom pacijentu je nakon kliničkog pregleda indiciran CT mozga i CT angiografija na kojima se postavila sumnja na postojanje dAVF, te je naknadno učinjena digitalna subtrakcijska angiografija (DSA) kojom je dokazano postojanje dAVF te se odredila klasifikacija fistula. U dogovoru sa neurokirurzima svim pacijentima je preporučen endovaskularni zahvat kojim su se različitim metodama u potpunosti embolizirali spojevi između arterija i venskih sinusa odnosno vena.

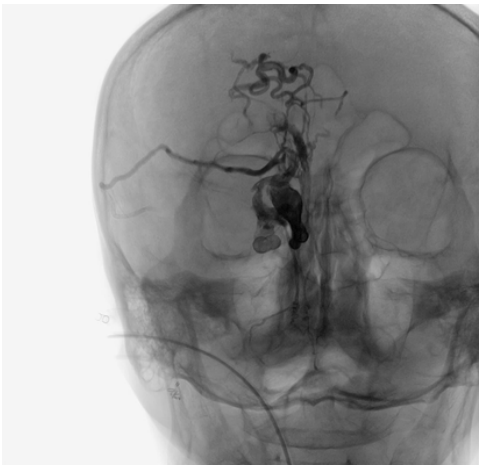
REZULTATI: Endovaskularnim zahvatom kod pacijenata postignuta je potpuna embolizacija svih ili gotovo svih spojeva unutar dAVF. Svi pacijenti su pokazali poboljšanje nakon zahvata. Na kontrolnoj CT angiografiji ili MR angiografiji kod svih pacijenata je prikazana potpuna okluzija dAVF.

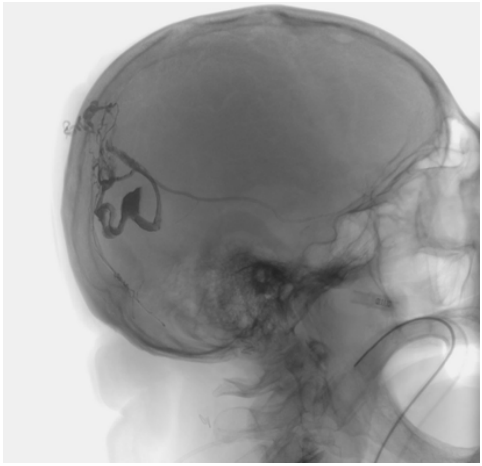
ZAKLJUČAK: DSA je zlatni standard u dijagnostici i klasifikaciji dAVF prema kojoj se kasnije određuje terapijski pristup. Endovaskularna embolizacija dAVF je prvi izbor liječenja kod pacijenata sa simptomatskim dAVF visokih stadija sa visokom stopom potpune okluzije spojeva unutar dAVF i remisije kliničkih simptoma.

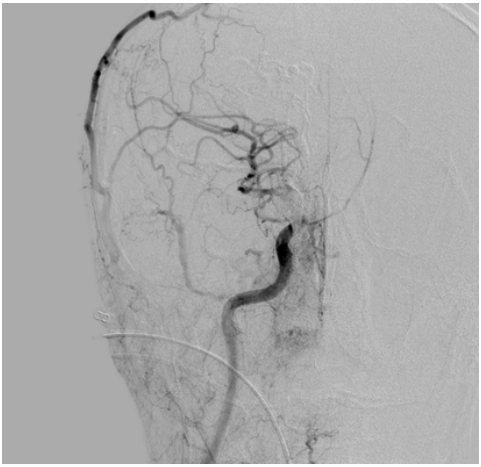
ABSTRACT

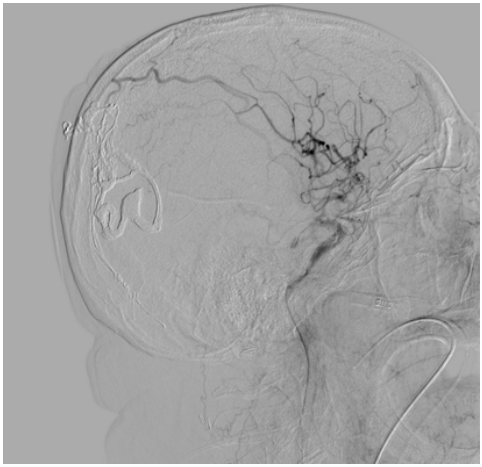
Authors: Petar Fekete, Petra Radić, Vladimir Kalousek

KBC Sestre Milosrdnice, KBC Sestre Milosrdnice, KBC Sestre Milosrdnice









ABSTRACT

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Klinički zavod za dijagnostičku i intervencijsku neuroradiologiju, KBC Zagreb, Hrvatska, Klinički zavod za dijagnostičku i intervencijsku neuroradiologiju, KBC Zagreb, Hrvatska

Povezanost vrijednosti leptomeningealne kolateralne cirkulacije na CT angiografiji s dugoročnim funkcionalnim ishodom nakon endovaskularnog liječenja okluzije arterija prednje cirkulacije

UVOD: Mehanička trombektomija (MT) je endovaskularni postupak liječenja akutnog ishemijskog moždanog udara (IMU-a) uzrokovanog okluzijom velikih krvnih žila. Unatoč visokoj stopi rekanalizacije, dobrobit liječenja nije jednaka u svih pacijenata. Kao bitan prognostički čimbenik u posljednje je vrijeme prepoznata vrijednost leptomeningealne kolateralne cirkulacije (LMKC).

CILJ: Utvrditi povezanost vrijednosti LMKC mozga s dugoročnim funkcionalnim ishodom nakon MT-a.

METODE: Proveli smo retrospektivno istraživanje medicinske dokumentacije i radioloških slikovnih zapisa pacijenata liječenih MT-om zbog okluzije velike krvne žile u prednjoj cirkulaciji u 2021. godini. Prikupljeni su osnovni demografski i anamnestički podatci, vrijeme nastupa simptoma, primjena intravenske trombolize te dugoročni funkcionalni ishod kvantificiran mRS bodovnom ljestvicom na temelju neurološkog pregleda tri mjeseca nakon MT-a. Analizom arhive radioloških nalaza i slikovnih zapisa odredili smo vrijednost ASPECTS bodovne ljestvice na nativnom CT pregledu, vrijednost kolateralne bodovne ljestvice po Tanu (0-3) na CT angiografiji te stupanj postignute rekanalizacije izražen mTICI bodovnom ljestvicom na DSA pregledu učinjenim u tijeku MT-a. Pacijenti su podijeljeni u dvije skupine: one s dobro razvijenom LMKC (Tan 2-3) te one sa slabo razvijenom LMKC (Tan 0-1). Razlike u prikupljenim podatcima između dviju skupina su ispitane odgovarajućim statističkim testovima, a kod statistički značajnih razlika učinjena je linearna regresija ANOVA testom.

REZULTATI: U istraživanje je uključeno 103 pacijenta, od čega su 72 pacijenta imali dobro, a 31 slabo razvijenu LMKC. Statistički je značajna razlika između skupina pronađena za starosnu dob pacijenata ($p = .008$), mTICI stupanj rekanalizacije ($p = .025$) te za mRS vrijednost nakon 90 dana ($p < .001$). Nakon provedene linearne regresije kao statistički značajna je dokazana ovisnost mRS funkcionalnog ishoda o vrijednost bodovne ljestvice po Tanu ($p = .013$) i vrijednost mTICI rekanalizacije ($p = 0.010$).

ZAKLJUČAK: U prikupljenom uzorku je dokazana statistički značajna ovisnost mRS dugoročnog funkcionalnog ishoda nakon MT o vrijednosti LMKC i stupnju mTICI rekanalizacije. Za dokazivanje prediktivne vrijednosti LKMC je potrebno učiniti istraživanje na većem uzorku.

ABSTRACT

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RELATION BETWEEN MAJOR ADVERSE CARDIOVASCULAR EVENTS AND INTRACRANIAL ARTERY CALCIFICATIONS IN PATIENTS ON HEMODIALYSIS

UVOD: Hemodialysis patients suffer from accelerated atherosclerosis which increases CV mortality. Currently, arterial stiffness and pulse wave velocity are standard in cardiovascular incidents prognosis. Intracranial artery calcification is diagnosed with computed tomography and is more often in patients with chronic kidney disease. Still, there is no consensus on its relation with cardiovascular incidents in patients on hemodialysis.

CILJ: The study focuses on the relation between intracranial artery calcification(IAC) and major adverse cardiovascular events(MACE), arterial stiffness markers, and ankle-brachial index in patients on hemodialysis. We will also explore associations of IAC with other parameters of HD patients.

METODE: Patients in the study will be patients from the hemodialysis unit and stroke patients from the University Hospital Zagreb. In this prospective, observational, longitudinal study, 80 hemodialysis patients who had a CT scan of the head will participate. Patients will be selected if they have been on chronic HD for at least three months. As a control group for assessing IAC, we will analyze CT scans from 80 diabetic patients who had an acute stroke. Two cohorts of patients will be age and sex-matched. Calcium scoring will be done using a semiquantitative method where 0 points will be given to arteries with no calcification and 1 point to arteries with any calcification. Mortality and clinical data of patients will be collected during regular hemodialysis procedures 2 or 3 times per week, from the hospital information system and the Croatian Institute of Public Health. A p-value <0.05 will be considered significant.

REZULTATI: Hemodialyzed patients had significantly higher intracranial and cerebral artery calcification scores than the diabetic control group. Deceased patients had a significantly higher number of calcified middle cerebral arteries as well as significantly higher intracranial artery calcification score and cerebral artery calcification scores. Age and calcified middle cerebral arteries had increased HR of 1.08 and 1.36 for cardiovascular mortality.

ZAKLJUČAK: The results of this study could show a correlation between intracranial artery calcifications and major adverse cardiovascular events.

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